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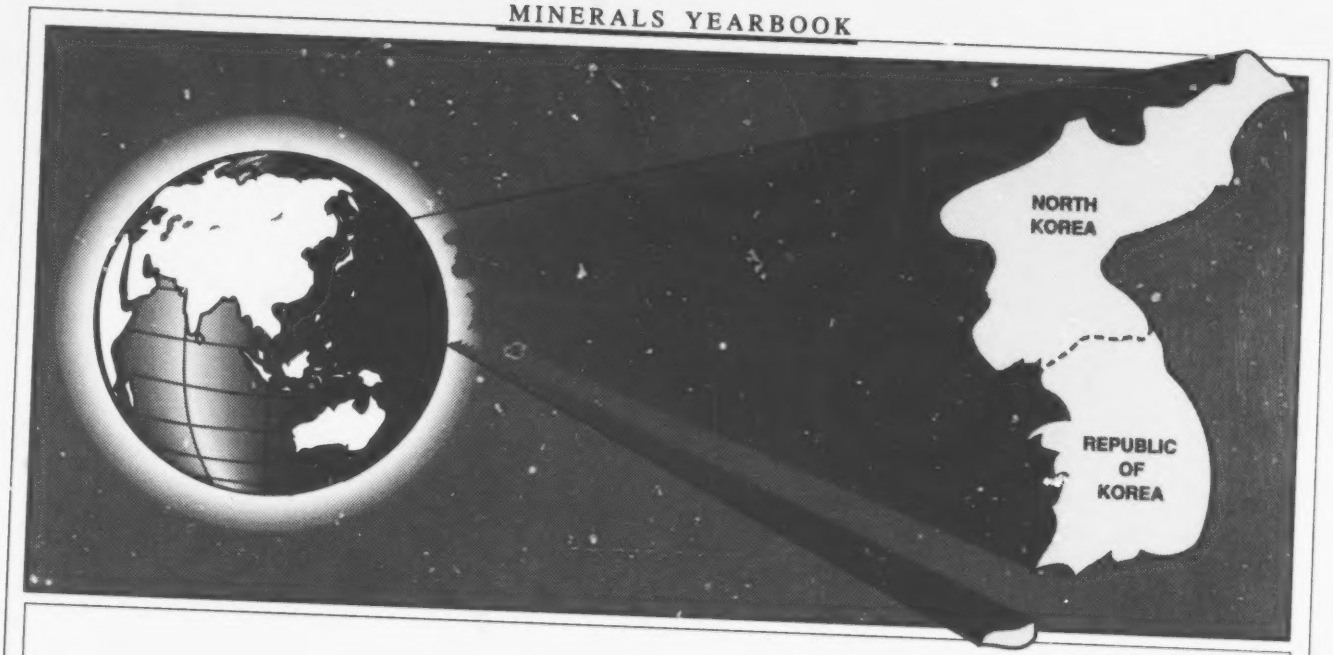

THE MINERAL INDUSTRIES OF

NORTH KOREA AND THE REPUBLIC OF KOREA

By Chin S. Kuo

1988

INTERNATIONAL REVIEW

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF MINES

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NORTH KOREA AND THE REPUBLIC OF KOREA

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1988

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THE MINERAL INDUSTRIES OF

NORTH KOREA AND THE REPUBLIC OF KOREA

By Chin S. Kuo[1]

NORTH KOREA

North Korea has been in an isolate state diplomatically and economically with the outside world except for the Centrally Planned Economy countries. In 1988, however, the country seemed to be losing ground with these allies including China, Hungary, Poland, the U.S.S.R., and Yugoslavia. These countries began to look elsewhere to establish economic relations, in particular, the booming Republic of Korea. The Soviets and South Koreans signed a memorandum of understanding between their trade associations in October. Trade between China and the Republic of Korea, mostly via Hong Kong and Japan, was estimated to amount to $3 billion[2] in 1988, whereas that between China and North Korea was only $519 million[3] for 1987. Hungary and the Republic of Korea also agreed to exchange trade missions in September. These allies claimed, however, that they were not deserting North Korea.

Nevertheless, under the philosophy of Juche (self-reliance), the country began to invite much needed foreign exchange to buy modern technology for economic development. The effort to attract foreign investment through joint ventures has been considered mostly unsuccessful since 1984. Another problem with foreign exchange was the default on $900 million in loans from more than 100 Western banks with interest unpaid since 1984. The creditor banks, hoping to get paid one way or another, began trying to attach North Korean ships that docked in Asian ports and tap the value of the country's gold exports. North Korea relies on developing countries such as African and Latin American nations for goods delivery.

North Korea's economy has been growing rather slowly. Labor-intensive light industries were built on the basis of a backsliding agricultural sector. The country is endowed with an abundance of mineral resources such as anthracite coal, graphite, iron ore, lead and zinc, magnesite, and tungsten. The country needs to develop its mineral resources and export mineral commodities in exchange for hard currency to establish basic industries and improve its economic development.

Trade with the Republic of Korea could grow from nothing to $1 billion within 1 year including shipment of coal, if economic ties were established. A trade protocol between North Korea and Albania was signed in October for Albania to export chromium ore, copper, and other unnamed metals in exchange for North Korea's sheet iron, steel, and zinc. Trade with Iran has involved 80,000 tons per year of lead concentrate and 250,000 tons per year of zinc concentrate to North Korea in return for 200,000 tons of North Korean steel products and joint cooperation in the exploration and extraction of bauxite, phosphate, and other minerals in Iran. Burkina Faso, a country in West Africa, and North Korea signed a trade agreement to supply Burkina cotton and mining products in return for North Korean agricultural machinery, fertilizer, and manufactured goods. Century Metals and Mining N.L. of Australia signed an agreement with Daehung Corp. of Pyongyang to access to 36.6 million tons of North Korean gold tailings at Suan for extracting gold. Century Metals will hold a 50% interest in this joint venture.

There are three large mining complexes in the country, namely, Anju, Komdok, and Musan that operate coal and iron ore mines. In the nonferrous sector, high-grade ore deposits have been discovered in the Districts of Huchang, Munrakyyong, Pungsan, Ryongam, and Sinpa in the northern highlands. The Chonghwa smelter of the Nakyon Mine was commissioned in August to produce various nonferrous metals. The Chongpyong Mine, a new nonferrous mineral production base, was being developed during the year. Output of nonferrous metals in 1988 was estimated to be 800,000 tons.

In the iron and steel sector, iron ore deposits of good quality have also been found in the Munrakyyong and Pungsan areas. Six major projects have been completed at the Kim Chaek iron and steel complex in North Hamgyong Province, the largest integrated steel plant in the country, as part of its second stage expansion program to increase production capacities of pig iron, steel, rolled steel, and cold-rolled sheet. At the Hwanghae iron and steel complex, automation, robotization, and computerization in various processes of production operations have been implemented. A 6,000-cubic-meter oxygen plant has also been installed. At the Musan mining complex, which is a leading iron ore producer, an underground mine began operation. Current capacity of the complex was 6.5 million tons per year of iron ore concentrates. At the Toksong Mine, an ore dressing plant has been built to extract iron from iron sulfide ore. The country's iron ore production for 1988 was 10 million tons. The project to expand iron ore production from 10 million to 15 million tons was underway. Steel production increased slightly from 4.5 million tons in 1987 to 4.7 million tons in 1988.

North Korea is the largest producer of magnesite in the world. The expansion of the Taehung Mine and the construction of an ore dressing plant with a throughput of 1.25 million tons per year of magnesite ore at the Ryongyang Mine were planned to enable North Korea to raise its output and quality of magnesia clinker by the Tanchon magnesia plant in South Hamgyong Province. At the Sunchon vinalon complex, the construction of a modern 250,000-ton-per-year caustic soda (sodium hydroxide) plant was begun. A new soda ash (sodium carbonate) plant was being built in the Namhung area. A superphosphate plant was to be built in Haeju, South Hwanghae Province.

Cement in North Korea is produced by large and small cement-producing complexes such as Chonnaeri, Haeju, Puraesan, Pusanri, Sunchon, and Sunghori. The Sunchon cement com-

TABLE 1

NORTH KOREA: ESTIMATED PRODUCTION OF MINERAL COMMODITIES[1 2]

(Metric tons unless otherwise specified)

Commodity		1984	1985	1986	1987	1988[p]
Aluminum metal ingot, primary		10,000	10,000	10,000	10,000	10,000
Cadmium metal, smelter		100	100	100	100	100
Cement, hydraulic	thousand tons	8,000	8,000	8,000	9,000	12,000
Coal:						
Anthracite	do.	r41,000	r44,000	r48,000	r55,000	62,000
Lignite	do.	12,000	13,000	14,000	15,000	18,000
Total	**do.**	**53,000**	**57,000**	**62,000**	**70,000**	**80,000**
Coke	do.	3,000	3,000	3,000	3,000	3,000
Copper:						
Mine output, Cu content		15,000	15,000	15,000	15,000	15,000
Metal:						
Smelter, primary and secondary		18,000	18,000	18,000	18,000	18,000
Refined, primary and secondary		22,000	22,000	22,000	22,000	22,000
Fluorspar		40,000	40,000	40,000	40,000	40,000
Gold, mine output, Au content	troy ounces	160,000	160,000	160,000	160,000	160,000
Graphite		25,000	25,000	25,000	25,000	25,000
Iron and steel:						
Iron ore and concentrate, marketable:						
Gross weight	thousand tons	8,000	8,000	8,500	8,500	9,000
Fe content	do.	3,200	3,200	r4,000	r4,000	4,200
Metal:						
Pig iron	do.	5,750	r7,750	r8,500	r8,500	8,500
Ferroalloys, furnace type unspecified	do.	120	120	120	120	120
Steel, crude	do.	6,500	6,500	4,500	4,500	4,700
Lead:						
Mine output, Pb content		110,000	110,000	110,000	110,000	110,000
Metal, primary and secondary		95,000	95,000	95,000	95,000	95,000
Magnesite, crude	thousand tons	1,900	1,900	1,900	1,500	1,500
Nitrogen, N content of ammonia	do.	450	450	450	450	500
Phosphate rock		500,000	500,000	500,000	500,000	500,000
Salt, all types		570,000	570,000	570,000	570,000	570,000
Silver, mine output, Ag content	thousand troy ounces	1,600	1,600	1,600	1,600	1,600
Sulfur	thousand tons	230	230	230	230	230
Talc, soapstone, pyrophyllite		170,000	170,000	170,000	170,000	170,000
Tungsten, mine output, W content		1,000	1,000	1,000	r500	500
Zinc:						
Mine output, Zn content		140,000	180,000	r225,000	r220,000	225,000
Metal, primary		120,000	180,000	180,000	210,000	210,000

[p] Preliminary. [r] Revised.

[1] Table includes data available through Aug. 18, 1989.

[2] In addition to the commodities listed, crude construction materials such as sand and gravel and other varieties of stone presumably are produced, but available information is inadequate to make reliable estimates of output levels.

TABLE 2

NORTH KOREA: APPARENT EXPORTS OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity	1986	1987[p]	Principal destinations, 1987
METALS			
Aluminum: Metal including alloys, all forms	11,459	6,998	Japan 3,678; Hong Kong 2,247; Singapore 1,073.
Copper: Metal including alloys, all forms	962	949	Japan 453; Singapore 427.
Gold: Metal including alloys, unwrought and partly wrought troy ounces	27,301	NA	
Iron and steel: Metal:			
Scrap	25,160	17,771	Japan 17,751; Netherlands 20.
Pig iron, cast iron, related materials	73,206	67,254	Japan 66,295; Hong Kong 959.
Ferroalloys	4,298	1,569	All to Japan.
Steel, primary forms	107,873	132,366	Japan 81,681; Thailand 34,864; Philippines 14,959.
Semimanufactures:			
Bars, rods, angles, shapes, sections	598	27	Italy 19; Japan 8.
Universals, plates, sheets	48,319	57,779	Hong Kong 25,563; Japan 20,664; Philippines 10,768.
Hoop and strip	182	20	All to Singapore.
Wire	198	19	Cyprus 14; Singapore 5.
Tubes, pipes, fittings	166	705	Niger 671; Trinidad and Tobago 26.
Castings and forgings, rough	85	11	All to Japan.
Lead: Metal including alloys, all forms	15,483	11,232	Japan 10,205; Singapore 1,027.
Magnesium: Metal including alloys, all forms	20	107	All to Japan.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$1,828	—	
Silver: Metal including alloys, unwrought and partly wrought do.	$8,664	$1,291	Do.
Zinc:			
Ore and concentrate	11,033	—	
Metal including alloys, all forms	41,658	52,707	Japan 36,487; Singapore 12,148; Hong Kong 3,436.
Other:			
Ores and concentrates	10	21	All to Japan.
Ashes and residues	3,331	4,117	Japan 3,761; Hong Kong 356.
Base metals including alloys, all forms	15	21	All to Singapore.
INDUSTRIAL MINERALS			
Abrasives, n.e.s.: Grinding and polishing wheels and stones	—	19	All to Philippines.
Cement	370	50	All to Japan.
Clays, crude	9,122	2,491	Do.
Feldspar, fluorspar, related materials	880	607	Do.
Fertilizer materials: Manufactured:			
Nitrogenous	—	4,000	Do.
Unspecified and mixed	—	75	All to Niger.
Graphite, natural	4,560	6,511	Japan 6,475; Austria 36.

See footnotes at end of table.

TABLE 2—Continued

NORTH KOREA: APPARENT EXPORTS OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity		1986	1987[p]	Principal destinations, 1987
INDUSTRIAL MINERALS—Continued				
Magnesium compounds, unspecified		194,163	[2]4,762	All to Spain.
Precious and semiprecious stones other than diamond: Natural and synthetic	value, thousands	$101	—	
Stone, sand and gravel:				
Dimension stone, all forms		8,457	8,258	All to Japan.
Gravel and crushed rock		494	827	Do.
Quartz and quartzite		—	928	Do.
Sulfur: Elemental including native and byproduct		131	—	
Talc, steatite, soapstone, pyrophyllite		23,800	9,864	Do.
Other:				
Crude		701	2	Do.
Slag and dross, not metal-bearing		—	2,167	Do.
MINERAL FUELS AND RELATED MATERIALS				
Carbon black		615	294	All to Thailand.
Coal, all grades including briquets		405,766	288,571	All to Japan.
Petroleum refinery products:				
Mineral jelly and wax	42-gallon barrels	79	—	
Kerosene and jet fuel	do.	442	—	
Residual fuel oil	do.	639	602,397	Japan 229,317; Singapore 217,529; Hong Kong 155,551.

[p] Preliminary. NA Not available.

[1] Table prepared by Audrey D. Wilkes. Owing to a lack of official trade data published by North Korea, this table should not be taken as a complete presentation of this country's mineral exports. These data have been compiled from United Nations information and data published by the partner trade countries. The United States did not report any imports of mineral commodities from North Korea during 1987.

[2] Excludes unreported quantity valued at $4,478,000 imported by Japan.

plex has a production capacity of 3 million tons per year. The Sariwon and Kaechon cement complexes were planned in the third 7-year plan (1987–93) to utilize raw materials from local sources. The country's production target of cement is 22 million tons per year by 1993 as compared with an output of 10 million tons in 1988. Daesong Jeryuk Trading Co. started the construction of a new 6,600-ton-per-year, coal-fired cement plant 20 kilometers from Pyongyang.

The Sariwon potassic fertilizer complex was still under construction. When completed, it will process 3 million tons of potassic feldspar and produce 510,000 tons of potassic fertilizer, 420,000 tons of alumina, and 10 million tons of cement per year. The complex is to be fed ore from mines at Chongdan and Chonggye, under development, and a mine at Chongpyong.

In coal mining, at the Sunchon vinalon complex, a 22-kilometer belt conveyor was under construction to link the coal mines with the carbide unit, the fuel processing unit, and the thermal powerplant of the complex. The powerplant has an installed capacity of 200,000 kilowatts with four turbo-generators. The Sunchon District coal mining complex increased coal production to an estimated 1.8 million tons in 1988. The coal mines in South Pyongan Province, the country's leading coal production base, and the Kaechon and Tokchon District coal mining complexes also increased coal output. North Korea produced 70 million tons of coal in 1987 and an estimated 80 million to 85 million tons in 1988. The Government projected the coal output to reach 120 million tons per year by 1993.

The country relied on oil from China and the U.S.S.R. during the past several years. According to a recent arrangement with Iran, North Korea will import 2 million tons per year of crude oil from Iran, which will be sufficient for domestic needs and displace oil imports from China and the U.S.S.R. In exchange North Korea will export raw material and metal to Iran.

TABLE 3

NORTH KOREA: APPARENT IMPORTS OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity	1986	1987[p]	Principal sources, 1987
METALS			
Alkali and alkaline-earth metals value, thousands	$6	$14	All from Japan.
Aluminum:			
Oxides and hydroxides	11,539	7,554	Do.
Metal including alloys:			
Scrap	—	16	All from Cyprus.
Unwrought	—	128	Hong Kong 119.
Semimanufactures	—	1,012	Japan 676; Italy 213; Belgium-Luxembourg 94.
Chromium:			
Ore and concentrate	25,000	—	
Oxides and hydroxides	64	83	Singapore 50; Hong Kong 28.
Cobalt: Oxides and hydroxides	3	1	All from Japan.
Columbium and tantalum: Metal including alloys, all forms, tantalum kilograms	386	(2)	Do.
Copper:			
Ore and concentrate	1,649	—	
Metal including alloys:			
Scrap	816	78	Cyprus 46; Singapore 32.
Unwrought	500	409	Hong Kong 400; Japan 9.
Semimanufactures	84	313	Japan 196; Singapore 91.
Gold: Metal including alloys, unwrought and partly wrought value, thousands	$7	—	
Iron and steel: Metal:			
Scrap	—	674	All from Japan.
Ferroalloys:			
Ferromanganese	843	6,653	Japan 5,000; Hong Kong 1,540.
Unspecified	1,922	7,211	Hong Kong 4,524; Japan 2,669.
Semimanufactures:			
Bars, rods, angles, shapes, sections	478	1,680	Hong Kong 1,608; Japan 70.
Universals, plates, sheets	3,486	3,955	Japan 2,376; Hong Kong 1,569.
Hoop and strip	434	398	Japan 346; Singapore 50.
Rails and accessories	1,687	1,396	All from Japan.
Wire	104	[3]1,244	Singapore 1,000; Italy 244.
Tubes, pipes, fittings	3,794	4,708	Japan 4,213; Hong Kong 440.
Castings and forgings, rough	1	(4)	All from Austria.
Lead:			
Ore and concentrate	2,375	2,200	All from Thailand.
Oxides	10	—	
Metal including alloys, all forms	6,940	7,504	Japan 6,556; Hong Kong 907.
Magnesium: Metal including alloys, all forms	68	56	All from Singapore.
Manganese:			
Ore and concentrate	30,578	200	Do.
Oxides	168	148	Japan 108; Singapore 40.

See footnotes at end of table.

TABLE 3—Continued

NORTH KOREA: APPARENT IMPORTS OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity	1986	1987[p]	Principal sources, 1987
METALS—Continued			
Mercury 76-pound flasks	145	—	
Molybdenum: Metal including alloys, all forms	—	7	All from Japan.
Nickel: Metal including alloys:			
Unwrought	638	1,894	Hong Kong 1,888; Belgium-Luxembourg 6.
Semimanufactures	2	NA	NA.
Platinum-group metals: Metals including alloys, unwrought and partly wrought value, thousands	$520	$107	All from Japan.
Silver: Metal including alloys, unwrought and partly wrought do.	$75	$25	Australia $23; Japan $2.
Tin:			
Ore and concentrate	20	—	
Oxides	2	—	
Metal including alloys:			
Unwrought	247	140	Singapore 83; Hong Kong 56.
Semimanufactures	(4)	17	All from Japan.
Titanium:			
Oxides	34	106	Japan 73; Hong Kong 33.
Metal including alloys, all forms	18	—	
Tungsten:			
Ore and concentrate	488	919	Hong Kong 855; Singapore 64.
Metal including alloys, all forms	1	(5)	All from Japan.
Zinc:			
Ore and concentrate	—	5,300	All from Australia.
Oxides	6	—	
Metal including alloys, all forms	147	2	All from Japan.
Other:			
Ores and concentrates	12,579	317	All from Australia.
Base metals including alloys, all forms	74	82	Hong Kong 34; Japan 27; Singapore 21.
INDUSTRIAL MINERALS			
Abrasives, n.e.s.:			
Natural: Corundum, emery, pumice, etc.	47	—	
Artificial: Corundum	58	—	
Dust and powder of precious and semiprecious stones excluding diamond value, thousands	$14	$62	Switzerland $35; Japan $27.
Grinding and polishing wheels and stones	28	92	Japan 59; Austria 33.
Asbestos, crude	—	36	All from Italy.
Boron materials: Oxides and acids	79	226	Italy 109; Hong Kong 95; Singapore 20.
Bromine including iodine and fluorine	24	—	
Cement	15	30	All from Japan.
Clays, crude	14	136	All from Singapore.
Diamond:			
Gem, not set or strung value, thousands	$150	—	
Industrial stones do.	$30	$36	All from Switzerland.

See footnotes at end of table.

TABLE 3—Continued

NORTH KOREA: APPARENT IMPORTS OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity	1986	1987[p]	Principal sources, 1987
INDUSTRIAL MINERALS—Continued			
Fertilizer materials:			
Crude, n.e.s.	298	—	
Manufactured:			
Nitrogenous	—	118	Japan 100; Italy 18.
Phosphatic	12	—	
Potassic	23,000	—	
Unspecified and mixed	513	23	All from Japan.
Fluorspar	2,304	—	
Gypsum and plaster	23,000	25	All from Thailand.
Iodine including bromine and fluorine kilograms	—	475	All from Hong Kong.
Magnesium compounds: Magnesite, crude	36	—	
Mica:			
Crude including splittings and waste	—	3	All from Singapore.
Worked including agglomerated splittings	—	[6]2	All from Austria.
Phosphates, crude	47,570	—	
Phosphorus, elemental	20	—	
Pigments, mineral: Iron oxides and hydroxides, processed value, thousands	—	$4	All from Japan.
Precious and semiprecious stones other than diamond:			
Natural do.	$23	$12	Japan $7; Thailand $3; Hong Kong $2.
Synthetic do.	$20	$46	Switzerland $28; Japan $18.
Salt and brine	296	319	All from Japan.
Sodium compounds, n.e.s.: Carbonate, natural and manufactured	—	1,770	Japan 1,620; Hong Kong 150.
Stone, sand and gravel:			
Dimension stone, all forms	1,207	304	Italy 299; Japan 5.
Quartz and quartzite	12	—	
Sulfur:			
Elemental, all forms	14,000	3	All from Japan.
Sulfuric acid	—	10	All from Singapore.
Other:			
Crude	142	—	
Metalloids, unspecified[7]	—	148	All from Hong Kong.
MINERAL FUELS AND RELATED MATERIALS			
Carbon black	988	1,189	Hong Kong 941; Singapore 246; Japan 2.
Coal, all grades including briquets	128,380	2	All from Singapore.
Coke and semicoke	104,490	14,280	All from Japan.
Petroleum refinery products:			
Gasoline 42-gallon barrels	274	—	
Mineral jelly and wax do.	1,866	1,739	Hong Kong 865; Japan 732.

See footnotes at end of table.

TABLE 3—Continued

NORTH KOREA: APPARENT IMPORTS OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity		1986	1987[p]	Principal sources, 1987
MINERAL FUELS AND RELATED MATERIALS—Continued				
Petroleum refinery products—Continued				
Kerosene and jet fuel	42-gallon barrels	352	186	All from Japan.
Distillate fuel oil	do.	165	—	
Lubricants	do.	26,463	4,590	Singapore 3,451; Spain 686.
Residual fuel oil	do.	372,020	2,944	All from Japan.
Bitumen and other residues	do.	18,659	—	
Petroleum coke	do.	—	22,000	Do.

[p] Preliminary. NA Not available.

[1] Table prepared by Audrey D. Wilkes. Owing to a lack of official trade data published by North Korea, this table should not be taken as a complete presentation of this country's mineral imports. These data have been compiled from the United Nations information and data published by the partner trade countries. The United States did not report any exports of mineral commodities to North Korea during 1987.

[2] Excludes unreported quantity valued at $247,000 exported by Japan.

[3] Excludes unreported quantity valued at $340,000 exported by Japan.

[4] Less than 1/2 unit.

[5] Unreported quantity valued at $21,000.

[6] Excludes unreported quantity valued at $20,000 exported by Japan.

[7] Reported under SITC item number as "selenium, tellurium, phosphorus, arsenic, etc."

REPUBLIC OF KOREA

The Republic of Korea produces limited quantities of mineral commodities that are not enough to provide the raw material requirements for its booming industries. Imports of coal, iron ore, nonferrous metal ore, and oil accounted for the major source of materials from abroad. Nevertheless, the country's economic growth had been steady at 12.2% and produced a gross national product (GNP) valued at $154 billion.[4] Per capita GNP increased to $3,624, a 28% jump from that of 1987.

The country produces no oil or gas and wants to obtain as much energy as possible from joint ventures in foreign countries in addition to other imports. The Government allocated $25.3 million in 1988 to help finance domestic companies investigating energy resources abroad and actively engaged in several overseas projects for oil, gas, and uranium development. Kodeco Energy Co. signed joint venture contracts with P.T. Gunanusa Utama Fabricators of Indonesia for natural gas exploration in West Madura, Indonesia. In the iron and steel sector, an additional $34.7 million by Pohang Iron and Steel Co. Ltd. (Posco) was invested in its U.S. subsidiary.

Production

Mineral production in the Republic of Korea contributed only 3.2% of the total industrial output in 1988. Coal mining was the most active sector with an output of 23 million tons of anthracite followed by industrial minerals and metal mining.

Trade

The Republic of Korea's foreign trade registered a moderate increase in value over that of 1987. Exports reported at $60.6 billion, a 28.3% increase, and imports reported at $51.8 billion, a 26.3% increase. The trade surplus, combined with nontrade earnings, pushed its current account to a record surplus at $14.3 billion. Among major exports, steel products worth $3.87 billion increased 32.5%, automobiles worth $3.6 billion increased 23.4%, and ships worth $1.7 billion increased 52.6%.

The Korean won surged 15.8% against the dollar in response to pressure from the U. S. Government, depressing the external cost for Korean merchandise. About 44% of the total value of exports went to the United States in 1988, while the value of exports to Japan and developing Pacific Rim countries was expected to increase in 1989. The country's trade with centrally planned economies increased 56% in 1988 to $2.7 billion and the largest chunk of that was with China. Trade with China through Hong Kong and Japan almost doubled 1987's level and was more than the amount reported between North Korea and China.

Commodity Review

***Metals.*—Copper.**—The rise in copper demand had been stalled by high copper prices. As a result, Korea Mining and Smelting Co. Ltd. had a small

TABLE 4

REPUBLIC OF KOREA: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity		1984	1985	1986	1987	1988[p]
METALS						
Aluminum, primary		18,252	17,695	18,643	21,554	17,500
Bismuth metal		126	135	—	145	—
Cadmium, smelter		230	—	—	—	490
Copper:						
Mine output, Cu content		279	309	220	178	36
Metal:						
Smelter		100,200	106,900	165,024	157,923	169,000
Refined, primary		129,078	140,144	157,846	154,591	168,334
Gold metal	troy ounces	79,156	77,258	149,436	244,345	357,548
Iron and steel:						
Iron ore and concentrate:						
Gross weight	thousand tons	625	542	ʳ582	470	390
Fe content	do.	350	304	ʳ326	263	218
Metal:						
Pig iron	do.	8,763	8,833	9,017	11,057	12,577
Ferroalloys:						
Ferromanganese		58,600	61,396	53,721	58,044	75,924
Ferrosilicon		35,300	34,840	30,939	12,646	8,909
Other		50,215	54,879	66,499	90,382	89,966
Total		**144,115**	**151,115**	**151,159**	**161,072**	**174,799**
Steel, crude	thousand tons	13,034	13,539	14,554	16,782	19,117
Lead:						
Mine output, Pb content		10,837	9,699	11,864	13,998	13,688
Metal, smelter		20,304	22,394	22,890	62,593	60,799
Manganese ore and concentrate:						
Gross weight		74	—	177	91	—
Mn content		30	—	71	36	—
Molybdenum, mine output, Mo content		158	333	315	325	144
Silver metal	thousand troy ounces	3,759	3,990	5,034	6,721	7,288
Tin, mine output, Sn content		19	21	1	3	—
Tungsten, mine output, W content		2,702	2,579	2,455	2,375	2,029
Zinc:						
Mine output, Zn content		49,232	45,746	37,282	23,530	21,820
Metal, primary		108,460	111,653	127,439	186,078	223,000
INDUSTRIAL MINERALS						
Asbestos		8,062	4,703	2,983	2,518	2,428
Barite		2,729	2,785	3,768	2,942	ᵉ3,000
Cement, hydraulic	thousand tons	20,413	20,424	23,403	25,662	28,995
Clays: Kaolin		721,220	658,282	846,742	630,945	832,110
Diatomaceous earth		48,496	53,613	54,841	64,783	71,952
Feldspar		127,057	145,414	130,895	180,269	241,511

See footnotes at end of table.

TABLE 4—Continued

REPUBLIC OF KOREA: PRODUCTION OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity		1984	1985	1986	1987	1988[p]
INDUSTRIAL MINERALS—Continued						
Fluorspar, metallurgical-grade		4,672	705	243	63	261
Graphite:						
Crystalline		2,305	1,602	641	838	3,383
Amorphous		56,258	69,877	96,577	106,507	104,384
Total		**58,563**	**71,479**	**97,218**	**107,345**	**107,767**
Kyanite and related materials: Andalusite		209	42	33	85	—
Mica: All grades		24,436	20,044	41,997	31,938	[e]30,000
Nitrogen: N content of ammonia		464,194	441,983	426,778	474,891	506,471
Salt		518,000	643,000	729,000	664,000	1,020,000
Sodium carbonate, manufactured		247,927	250,890	264,213	[e]288,500	[e]280,000
Stone, sand and gravel:						
Limestone	thousand tons	33,456	35,164	38,117	41,675	46,377
Quartzite	do.	868	872	885	1,235	1,379
Sand including glass sand	do.	858	1,096	1,233	1,350	1,488
Talc and related materials:						
Pyrophyllite		656,442	738,304	587,049	690,819	673,776
Talc		192,208	194,174	210,631	161,052	146,478
MINERAL FUELS AND RELATED MATERIALS						
Carbon black		82,369	91,019	120,534	146,758	183,346
Coal: Anthracite	thousand tons	21,370	24,543	24,253	24,273	24,295
Coke	do.	5,199	[e]5,200	[e]5,100	[e]5,100	[e]5,200
Fuel briquets: Anthracite briquets		21,316	19,453	20,595	23,587	22,926
Petroleum refinery products:						
Gasoline	thousand 42-gallon barrels	5,519	9,729	9,821	10,936	13,618
Jet fuel	do.	10,469	10,000	9,662	[e]9,500	[e]9,500
Kerosene	do.	9,109	10,452	9,559	7,966	10,619
Distillate fuel oil	do.	54,156	54,783	58,859	60,296	73,504
Residual fuel oil	do.	84,907	75,566	75,937	[e]73,400	[e]75,000
Lubricants	do.	1,962	3,807	7,317	[e]7,100	[e]7,300
Other	do.	43,288	19,031	13,576	[e]15,000	[e]15,000
Refinery fuel and losses[e]	do.	6,400	4,036	4,000	4,000	4,000
Total	**do.**	**215,810**	**187,404**	**188,731**	**[e]188,198**	**[e]208,541**

[e]Estimated. [p]Preliminary. [r]Revised.
[1]Includes data available through June 20, 1988.

surplus of 10,000 tons to export-through Singapore in 1988. On the other hand, Hyosung Corp., a South Korean trading company, for the first time via Hong Kong, imported 200 tons of North Korean copper to be used to make electric cables. Domestic demand rose to 310,000 tons, which was used by cable makers, fabricators, and others.

Korea Mining and Smelting's Changhang smelter had been operating at one-half of its 50,000-ton-per-year capacity for the past few years, but, in 1988, it produced 50,000 tons while the Onsan complex was expanded from a capacity of 100,000 to 140,000 tons per year. Imported copper scrap and blister amounted to 60,000 tons. The country was the largest importer of alloyed and unalloyed copper scrap from the United States.

TABLE 5

REPUBLIC OF KOREA: EXPORTS OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity	1986	1987	Destinations, 1987	
			United States	Other (principal)
METALS				
Alkali and alkaline-earth metals value, thousands	—	$5	—	All to Japan.
Aluminum:				
Oxides and hydroxides	91	191	—	Bangladesh 93; Thailand 33.
Metal including alloys:				
Scrap	266	71	—	Japan 70.
Unwrought	786	2,875	4	Japan 2,194; Singapore 548.
Semimanufactures	18,108	24,925	812	Hong Kong 7,693; Philippines 4,311.
Antimony:				
Oxides	53	NA		
Metal including alloys, all forms	280	NA		
Arsenic: Oxides and acids	41	NA		
Bismuth: Metal including alloys, all forms	178	NA		
Cadmium:				
Oxides and hydroxides	465	NA		
Metal including alloys, all forms	104	NA		
Chromium: Oxides and hydroxides	—	3	—	Mainly to Indonesia.
Cobalt: Oxides and hydroxides	21	42	—	All to Japan.
Columbium and tantalum: Metal including alloys, all forms: Tantalum value, thousands	—	$31	—	Japan $30.
Copper:				
Matte and speiss including cement copper do.	—	$2	$1	NA.
Metal including alloys:				
Scrap	1,180	454	7	Japan 329; Hong Kong 31.
Unwrought	5,756	183,920	—	Malaysia 179,937; Japan 2,329.
Semimanufactures	40,334	42,844	1,699	Hong Kong 10,114; India 7,706.
Gold: Metal including alloys, unwrought and partly wrought troy ounces	48,270	NA		
Iron and steel:				
Iron ore and concentrate excluding roasted pyrite	3,092	8	—	All to Japan.
Metal:				
Scrap	71,525	42,164	249	Japan 27,538; Thailand 13,800.
Pig iron, cast iron, related materials	1,515	3,532	7	Spain 2,000; Japan 1,431.
Ferroalloys:				
Ferromanganese	5	5	—	All to Japan.
Ferrosilicon	20	NA		
Unspecified	3,031	114	—	Do.
Steel, primary forms thousand tons	1,354	1,686	161	Japan 976; Indonesia 87.
Semimanufactures:				
Bars, rods, angles, shapes, sections	1,939,537	1,611,308	145,936	Japan 335,511; Dominica 55,735.
Universals, plates, sheets	1,642,980	1,732,537	462,324	Japan 697,200; Saudi Arabia 62,048.

See footnotes at end of table.

TABLE 5—Continued

REPUBLIC OF KOREA: EXPORTS OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity	1986	1987	Destinations, 1987	
			United States	Other (principal)
METALS—Continued				
Iron and steel—Continued				
Metal—Continued				
Semimanufactures—Continued				
Hoop and strip	41,348	55,732	7,289	Japan 11,855; Singapore 6,245.
Rails and accessories	50,424	62,345	3,729	India 16,346; Singapore 10,289.
Wire	144,834	161,254	11,498	Japan 42,175; Hong Kong 13,779.
Tubes, pipes, fittings	779,874	912,871	390,377	Japan 202,103; Canada 55,949.
Castings and forgings, rough	23,281	29,295	13,061	Japan 6,388; Canada 3,072.
Lead:				
Ore and concentrate	—	4,606	—	Australia 3,070; Japan 1,536.
Oxides	20	3,598	3	Japan 3,348; Indonesia 239.
Metal including alloys:				
Scrap	2	716	—	Japan 710.
Unwrought	9,187	8,715	28	Japan 3,632; Singapore 1,540.
Semimanufactures	81	188	(2)	Saudi Arabia 114; Pakistan 20.
Magnesium: Metal including alloys:				
Scrap	20	11	—	All to Japan.
Unwrought	28	18	—	Do.
Semimanufactures	27	93	—	Japan 87.
Manganese:				
Ore and concentrate, battery-grade	70	—		
Oxides	31	107	—	Japan 70; Sri Lanka 25.
Molybdenum:				
Ore and concentrate	308	—		
Metal including alloys, all forms	—	1	—	All to United Kingdom.
Nickel: Metal including alloys:				
Scrap	225	639	8	Japan 630.
Unwrought	—	42	—	All to Japan.
Semimanufactures	6	53	(2)	France 19; Hong Kong 15.
Platinum-group metals:				
Waste and sweepings value, thousands	$819	—		
Metals including alloys, unwrought and partly wrought do.	$298	$895	$306	Japan $423; Hong Kong $166.
Silver:				
Waste and sweepings kilograms	193	10,650	44	United Kingdom 8,491; Japan 1,681.
Metal including alloys, unwrought and partly wrought value, thousands	$3,907	$22,330	$1	Japan $18,936; Hong Kong $716.
Tin: Metal including alloys:				
Scrap	32	53	—	Japan 52.
Unwrought	116	206	(2)	Japan 205.

See footnotes at end of table.

TABLE 5—Continued

REPUBLIC OF KOREA: EXPORTS OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity	1986	1987	Destinations, 1987	
			United States	Other (principal)
METALS—Continued				
Tin: Metal including alloys—Continued				
Semimanufactures	13	29	—	Hong Kong 4; Pakistan 4; Japan 3.
Titanium: Oxides	1,496	3,215	214	Japan 2,290; Indonesia 221.
Tungsten:				
Ore and concentrate	514	467	—	Japan 330; Netherlands 108.
Oxides and hydroxides	15	NA		
Metal including alloys, all forms	261	289	2	Japan 174; United Kingdom 55.
Zinc:				
Oxides	4,445	5,638	17	Japan 4,533; Sri Lanka 458.
Ash and residue containing zinc	9,452	NA		
Metal including alloys:				
Scrap	1	100	—	All to Indonesia.
Unwrought	1,720	38,035	6,047	Japan 24,800; Indonesia 1,165.
Semimanufactures	445	870	45	Japan 228; Jordan 152.
Other:				
Ores and concentrates	—	43,719	—	Japan 43,593; Belgium-Luxembourg 54.
Base metals including alloys, all forms	—	715	190	Japan 413; Netherlands 105.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc.	23	(3)	—	Mainly to Thailand.
Artificial: Corundum value, thousands	—	$3	$3	
Dust and powder of precious and semiprecious stones including diamond do.	$4	$63	$1	West Germany $35; Japan $26.
Grinding and polishing wheels and stones	1,278	2,147	382	Australia 527; Canada 187.
Asbestos, crude	—	41	—	Japan 40.
Cement thousand tons	4,401	4,910	549	Japan 1,526; Hong Kong 1,303.
Chalk	11	—		
Clays, crude	63,158	60,671	—	Japan 52,059; Thailand 397.
Diamond:				
Gem, not set or strung value, thousands	$1,662	$581	$123	Japan $340; Belgium-Luxembourg $118.
Industrial stones do.	—	$2	—	All to Japan.
Diatomite and other infusorial earth	167	423	—	Indonesia 155; unspecified 250.
Feldspar, fluorspar, related materials	16,759	19,258	—	Japan 23; unspecified 19,235.
Fertilizer materials:				
Crude, n.e.s.	388	861	—	All to Japan.
Manufactured:				
Ammonia	32	27	—	Norway 20.
Nitrogenous	143,772	117,524	—	Philippines 57,363; Nigeria 15,000; Fiji 12,100.
Phosphatic	35,713	26,580	—	Japan 22,030; Fiji 4,300.

See footnotes at end of table.

TABLE 5—Continued

REPUBLIC OF KOREA: EXPORTS OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity	1986	1987	Destinations, 1987	
			United States	Other (principal)
INDUSTRIAL MINERALS—Continued				
Fertilizer materials—Continued				
Manufactured—Continued				
Potassic	36,677	41,172	—	Malaysia 20,829; Japan 12,950.
Unspecified and mixed	927,415	902,341	—	Thailand 199,314; Japan 135,813; Hong Kong 35,056.
Graphite, natural	30,969	56,833	—	Japan 48,250; Kuwait 700.
Gypsum and plaster	69	86	—	Sudan 12; unspecified 70.
Lime	7,432	2,010	—	Ethiopia 1,500; Papua New Guinea 503.
Magnesium compounds: Magnesite, crude	16	33	—	Mainly to Philippines.
Mica: Worked including agglomerated splittings	(2)	3	—	All to Japan.
Pigments, mineral: Iron oxides and hydroxides, processed	27	46	—	France 10; unspecified 36.
Potassium salts, crude	—	10,176	—	All to Thailand.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$10,039	$11,522	$5,178	Japan $5,173; Hong Kong $868.
Synthetic do.	$15,920	$17,977	$13,235	Switzerland $1,096; Spain $1,067.
Salt and brine	11,689	50,269	22,345	Japan 27,726; Canada 94.
Sodium compounds, n.e.s.: Carbonate, manufactured	715	9	—	Malaysia 6; Libya 2.
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	298,709	329,985	5	Japan 308,892.
Worked	69,527	118,222	—	Japan 116,031.
Dolomite, chiefly refractory-grade	116,563	163,195	—	Japan 163,152.
Gravel and crushed rock	412	347	—	Japan 327; Indonesia 20.
Quartz and quartzite	6,654	4,919	—	Japan 4,414; Indonesia 53.
Sand other than metal-bearing	2,012	1,985	—	Japan 168; unspecified 1,800.
Sulfur: Elemental, crude including native and byproduct	3,399	4,961	—	Indonesia 1,872; Bangladesh 1,209.
Sulfuric acid	108	178	—	Libya 12; unspecified 150.
Talc, steatite, soapstone, pyrophyllite	42,486	36,580	701	Thailand 9,778; Japan 6,600.
Vermiculite	78	NA		
Other:				
Crude	249,130	342,306	—	Japan 225,752; unspecified 111,339.
Slag and dross, not metal-bearing	124,517	77,545	—	Japan 77,524.
MINERAL FUELS AND RELATED MATERIALS				
Carbon black	15,836	12,572	—	Indonesia 3,651; Sudan 2,885; Japan 1,742.
Coal: Anthracite and bituminous	—	1,120	—	Japan 1,001.
Coke and semicoke	2,462	7,817	—	Japan 7,500; Thailand 200.

See footnotes at end of table

TABLE 5—Continued

REPUBLIC OF KOREA: EXPORTS OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity		1986	1987	Destinations, 1987	
				United States	Other (principal)
MINERAL FUELS AND RELATED MATERIALS—Continued					
Petroleum:					
Crude	value, thousands	$7,579	$144	$144	
Refinery products:					
Liquefied petroleum gas	thousand 42-gallon barrels	(2)	112	—	Japan 103; Madagascar 9.
Gasoline including naphtha	do.	10,445	7,528	243	Japan 6,696.
Mineral jelly and wax	do.	1	4	—	Bangladesh 2; Japan 1.
Kerosene and jet fuel	do.	2,900	60,767	24,182	Singapore 25,700; Saudi Arabia 6,870.
Distillate fuel oil	do.	5,069	5,635	13	Japan 4,477.
Lubricants	do.	775	563	10	Japan 37; unspecified 428.
Residual fuel oil	do.	104,882	90,969	56,401	Japan 16,410; Singapore 12,341.
Bitumen and other residues	do.	53	36	3	Hong Kong 19; Malaysia 5.
Bituminous mixtures	do.	(2)	16	—	Pakistan 10; Japan 4.

NA Not available.
[1] Table prepared by Audrey D. Wilkes.
[2] Less than 1/2 unit.
[3] Unreported quantity valued at $2,000.

Gold.—Gold is one of the country's most valuable mineral resources. Because of the rebound in gold price and strong domestic demand, the Ministry of Energy and Resources planned to increase gold production by 20% each year for the next 5 years, reaching 35,400 troy ounces in 1988 and 48,200 troy ounces in 1991. Kumwang Mining Co. Ltd. and Young Poong Corp. were actively engaged in gold mining in Kumwang, about 75 kilometers southeast of Seoul. Other mining companies either developed new pits in Dongwon or concentrated more on recovering the precious metal from their mines. Meanwhile, gold imports of 643,000 troy ounces were reported to have taken place in 1988.

Iron and Steel.—Sammi Steel Co. Ltd., the only stainless sheet producer, planned to boost stainless and special steel production capacity to 1 million tons per year at its Chang Won works near Pusan by 1990. The installed total combined capacity of this plant and the Ulsan plant, north of Pusan, was 385,000 tons per year in 1988. Domestic and imported stainless scrap and imported stainless hot coil from Japan were the major sources for these plants. Posco continued construction of its 240,000-ton-per-year stainless steel plant at Pohang, which was to cost $140 million. When completed in 1989, the plant is expected to produce 190,000 tons of hot-rolled coil and 50,000 tons of wire rod.

The commissioning in July of Posco's new 3,800-cubic-meter blast furnace at Kwangyang brought an end to second-phase construction, increasing raw steel capacity to 5.4 million tons per year. Together with Pohang's earlier capacity of 9.1 million tons per year, it made Posco the third largest steel company in the world. The third phase of expansion was started in November, including a second hot coil mill capable of producing 7.5 million tons per year when completed in 1990. The expansion will add 2.7 million tons of raw steel, raising Posco's total capacity to 17.2 million tons per year by 1991.

Posco also commissioned its 1.22-million-ton-per-year cold-rolling mill at Kwangyang. Another cold-rolled maker, Dongbu Steel Co. Ltd., was building a second color-coating line with a capacity of 100,000 tons per year at its Inchon works. The works' first color line produces 70,000 tons.

Posco contributed nearly 90% of all the steel produced in the country. The increased demand for iron ore and coal by Posco bolstered 3 domestic shipyards to build at least 10 bulk carriers to transport cargo required by Posco. The country's shipyards were recovering from the worldwide shipbuilding slump. In addition, the won apprecia-

TABLE 6

REPUBLIC OF KOREA: IMPORTS OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity	1986	1987	Sources, 1987	
			United States	Other (principal)
METALS				
Alkali and alkaline-earth metals	(2)	197	33	Japan 110; France 34.
Aluminum:				
Ore and concentrate	15,571	30,363	3	Hong Kong 17,115; Guyana 7,532.
Oxides and hydroxides	93,127	107,010	223	Australia 63,364; Japan 40,583.
Metal including alloys:				
Scrap	8,799	43,244	35,366	Saudi Arabia 1,413; Kuwait 1,176.
Unwrought	184,512	513,496	8,954	Hong Kong 314,524; Australia 79,915.
Semimanufactures	30,582	44,461	5,767	Japan 15,694; Australia 7,543.
Antimony:				
Ore and concentrate	4,655	NA		
Oxides	644	NA		
Metal including alloys, all forms	298	NA		
Beryllium: Metal including alloys, all forms value, thousands	—	$49	$47	Japan $2.
Chromium:				
Ore and concentrate	3,274	41,150	—	Japan 36,000; Philippines 5,053.
Oxides and hydroxides	2,422	2,668	1,124	Japan 910; United Kingdom 333.
Cobalt:				
Oxides and hydroxides	30	56	1	Finland 24; Japan 10.
Metal including alloys, all forms	444	NA		
Columbium and tantalum: Metal including alloys, all forms: Tantalum value, thousands	$89	$730	$26	Japan $693.
Copper:				
Ore and concentrate	389,143	555,628	25,912	Papua New Guinea 166,409; Canada 83,745.
Matte and speiss including cement copper	18,897	9,941	3,277	India 6,159; Norway 505.
Oxides and hydroxides	924	NA		
Sulfate	84	NA		
Metal including alloys:				
Scrap	74,949	215,937	120,059	Hong Kong 28,407; Saudi Arabia 23,657.
Unwrought	99,682	120,012	2,859	Chile 47,765; Japan 22,941.
Semimanufactures	17,355	26,324	458	Japan 13,537; Thailand 445.
Gold:				
Ore and concentrate	4,783	NA		
Metal including alloys, unwrought and partly wrought troy ounces	189,524	NA		
Indium: Metal including alloys, all forms kilograms	243	NA		
Iron and steel:				
Iron ore and concentrate:				
Excluding roasted pyrite thousand tons	11,941	18,011	(3)	Australia 6,527; Brazil 4,884; India 3,578.
Pyrite, roasted	—	9,832	—	Philippines 9,831.

See footnotes at end of table.

TABLE 6—Continued

REPUBLIC OF KOREA: IMPORTS OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity		1986	1987	Sources, 1987	
				United States	Other (principal)
METALS—Continued					
Iron and steel—Continued					
Metal:					
Scrap	thousand tons	3,115	3,519	2,619	Australia 247; Netherlands 188.
Pig iron, cast iron, related materials		392,146	679,644	40,358	Brazil 310,498; Hong Kong 19,569.
Ferroalloys:					
Ferrochromium		10,431	NA		
Ferromanganese		1,124	4,409	—	Japan 969; Spain 740; Norway 650.
Ferromolybdenum		582	NA		
Ferronickel		725	NA		
Ferrosilicomanganese		5	NA		
Ferrosilicon		15,834	NA		
Ferrovanadium		262	—		
Silicon metal		2,627	NA		
Unspecified		3,852	63,069	310	Philippines 8,451; Norway 4,369.
Steel, primary forms	thousand tons	1,688	1,908	12	Japan 671; Brazil 344.
Semimanufactures:					
Bars, rods, angles, shapes, sections		424,717	998,918	10,908	Japan 520,455; Belgium-Luxembourg 15,591.
Universals, plates, sheets		1,471,716	1,314,482	3,100	Japan 1,155,042; Brazil 31,783.
Hoop and strip		38,889	45,751	111	Japan 40,037; France 2,281.
Rails and accessories		1,531	3,060	31	Japan 2,433; West Germany 366.
Wire		37,543	85,827	228	Japan 84,173; France 599.
Tubes, pipes, fittings		119,396	245,599	40,259	Japan 161,904; Austria 14,639.
Castings and forgings, rough		2,237	2,845	187	Japan 2,485.
Lead:					
Ore and concentrate		—	4,861	—	All from Canada.
Oxides		16	11	—	West Germany 9; Japan 2.
Metal including alloys:					
Scrap		39,382	45,894	6,415	Australia 12,470; Saudi Arabia 9,054.
Unwrought		55,032	76,529	1,648	Australia 46,116; Peru 10,932.
Semimanufactures		376	78	10	Japan 59.
Lithium:					
Oxides and hydroxides		287	NA		
Metal including alloys, all forms	kilograms	176	NA		
Magnesium: Metal including alloys:					
Scrap		5	8	8	
Unwrought		838	1,157	454	Norway 557; Canada 84.
Semimanufactures		85	279	74	Canada 160; Japan 13.

See footnotes at end of table.

TABLE 6—Continued

REPUBLIC OF KOREA: IMPORTS OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity		1986	1987	Sources, 1987	
				United States	Other (principal)
METALS—Continued					
Manganese:					
Ore and concentrate		222,529	368,375	—	Australia 164,885; India 118,228; Gabon 28,862.
Oxides		2,408	4,117	(3)	Japan 2,213; Belgium-Luxembourg 332.
Mercury	76-pound flasks	568	841	58	Japan 232; West Germany 116.
Molybdenum:					
Ore and concentrate		263	NA		
Metal including alloys, all forms		28	32	7	Japan 21.
Nickel:					
Matte and speiss	value, thousands	$5	$5	$5	
Oxides and hydroxides		36	NA		
Metal including alloys:					
Scrap		284	555	118	Japan 135.
Unwrought		5,839	4,962	56	Canada 2,239; Australia 587.
Semimanufactures		1,085	2,130	245	France 533; Japan 447.
Platinum-group metals: Metals including alloys, unwrought and partly wrought	value, thousands	$3,067	$3,162	$988	United Kingdom $1,122; Japan $671.
Selenium, elemental		11	NA		
Silver:					
Ore and concentrate		4,783	4,007	28	Japan 2,368; Peru 924.
Waste and sweepings	value, thousands	$1	$1,703	$1,703	
Metal including alloys, unwrought and partly wrought	do.	$1,294	$1,650	$147	Japan $1,195; France $171.
Tin:					
Ore and concentrate		1,532	3,698	—	Thailand 919; Burma 525; Nigeria 215.
Metal including alloys:					
Scrap		35	3	—	All from Japan.
Unwrought		3,754	4,295	7	Malaysia 2,767; Indonesia 1,106.
Semimanufactures		263	415	203	Japan 80; Malaysia 33.
Titanium:					
Ore and concentrate		50,095	NA		
Oxides		4,196	3,558	89	Japan 2,456; West Germany 879.
Metal including alloys, all forms		204	NA		
Tungsten: Metal including alloys, all forms		169	121	78	Japan 37.
Uranium and/or thorium:					
Ore and concentrate	value, thousands	—	$11	—	All from Malaysia.
Metal including alloys, all forms		64	NA		
Zinc:					
Ore and concentrate		179,136	408,138	—	Australia 194,794; Canada 100,534.
Oxides		151	309	79	Japan 207.

See footnotes at end of table

TABLE 6—Continued

REPUBLIC OF KOREA: IMPORTS OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity	1986	1987	Sources, 1987	
			United States	Other (principal)
METALS—Continued				
Zinc—Continued				
Ash and residue containing zinc	1,387	NA		
Metal including alloys:				
Scrap	13,109	10,010	1,238	Japan 6,863; Saudi Arabia 915.
Unwrought	117,492	36,388	—	Hong Kong 3,119; Peru 1,229; unspecified 21,470.
Semimanufactures	750	1,308	9	Japan 896; Peru 400.
Zirconium: Ore and concentrate	10,844	NA		
Other:				
Ores and concentrates	—	58,709	187	Malaysia 43,510; Australia 21,785.
Ashes and residues	—	1,487	143	Japan 681; Saudi Arabia 635.
Base metals including alloys, all forms	—	1,895	81	Japan 461; Hong Kong 266.
INDUSTRIAL MINERALS				
Abrasives, n.e.s.:				
Natural: Corundum, emery, pumice, etc.	7,002	16,309	1,795	Japan 9,497; Indonesia 3,608.
Artificial:				
Corundum	21,923	29,139	207	Japan 13,853; Brazil 2,732.
Silicon carbide	7,097	NA		
Dust and powder of precious and semiprecious stones including diamond value, thousands	$23,385	$30,197	$2,954	Ireland $25,605; Japan $1,335.
Grinding and polishing wheels and stones	1,129	1,309	60	Japan 974; Austria 48.
Asbestos, crude	68,017	77,596	—	Canada 28,014; Zimbabwe 9,766.
Barite and witherite	1,436	3,241	—	Thailand 1,425; United Kingdom 893; Ireland 452.
Boron materials:				
Crude natural borates	1,862	2,523	1,564	Turkey 954.
Oxides and acids	2,329	2,932	2,214	Italy 526.
Bromine	228	NA		
Cement	16,634	7,691	34	France 4,390; Japan 2,216.
Chalk	2,571	4,950	—	France 4,908.
Clays, crude	112,484	244,230	171,509	Hong Kong 24,233; Japan 18,277.
Cryolite and chiolite	10	40	—	Japan 35; Denmark 5.
Diamond:				
Gem, not set or strung value, thousands	$2,173	$1,029	$330	Belgium-Luxembourg $692.
Industrial stones do.	$1,131	$1,775	$1,220	Japan $206; Belgium-Luxembourg $130.
Diatomite and other infusorial earth	77	98	18	Japan 57; Spain 19.
Feldspar, fluorspar, related materials	29,393	63,660	37	Thailand 35,440; Japan 2,409.
Fertilizer materials: Manufactured:				
Ammonia	375,636	422,975	275,878	Indonesia 41,975; Saudi Arabia 34,916.
Nitrogenous	987	22,931	22,057	Chile 300; West Germany 176.

See footnotes at end of table.

TABLE 6—Continued

REPUBLIC OF KOREA: IMPORTS OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity	1986	1987	Sources, 1987	
			United States	Other (principal)
INDUSTRIAL MINERALS—Continued				
Fertilizer materials: Manufactured—Continued				
Phosphatic	—	3	—	All from West Germany.
Potassic	429,960	697,864	15,288	Canada 512,461; Jordan 61,338.
Unspecified and mixed	783	883	(3)	Japan 59; unspecified 774.
Graphite, natural	3,180	3,784	(3)	Japan 317; Hong Kong 234; unspecified 3,131.
Gypsum and plaster	227,813	198,685	70	Thailand 156,517; Mexico 28,439.
Iodine	14	NA		
Kyanite and related materials	3,141	NA		
Lime	28	41	2	Japan 32.
Magnesium compounds: Magnesite, crude including calcined	76,097	59,209	155	Japan 16,945; Hong Kong 6,215; unspecified 35,467.
Mica:				
Crude including splittings and waste	988	1,084	227	Malaysia 419; India 241.
Worked including agglomerated splittings	235	403	3	Switzerland 161; Japan 149.
Nitrates, crude	6,680	7,798	—	Chile 7,276; West Germany 62.
Phosphates, crude thousand tons	1,608	1,702	1,357	Jordan 141; Morocco 56.
Phosphorus, elemental	1,856	NA		
Pigments, mineral:				
Natural, crude	195	NA		
Iron oxides and hydroxides, processed	7,617	15,228	3,152	Japan 9,662; Belgium-Luxembourg 778.
Precious and semiprecious stones other than diamond:				
Natural value, thousands	$7,657	$7,611	$3,246	Hong Kong $1,427; Brazil $1,289.
Synthetic do.	$12,902	$20,688	$8,805	Japan $6,389; Switzerland $718.
Pyrite, unroasted	10	—		
Salt and brine	872,771	1,102,544	3	Australia 865,022; Yemen (Sanaa) 106,610.
Sodium compounds n.e.s.:				
Carbonate, manufactured	36,127	44,310	44,307	Singapore 3.
Sulfate, manufactured	19,028	NA		
Stone, sand and gravel:				
Dimension stone:				
Crude and partly worked	3,166	4,936	187	India 2,116; Japan 1,124.
Worked	6,453	4,253	704	Italy 2,989; Japan 342.
Dolomite, chiefly refractory-grade	459	425	—	United Kingdom 174; Japan 140; Norway 111.
Gravel and crushed rock	2,215	2,642	54	France 1,401; Japan 1,123.
Limestone other than dimension	12,008	5,779	21	Japan 5,674; United Kingdom 83.
Quartz and quartzite	809	1,146	72	Sweden 522; Japan 153.
Sand other than metal-bearing	198,992	260,925	171	Australia 205,982; Malaysia 41,000.

See footnotes at end of table.

TABLE 6—Continued

REPUBLIC OF KOREA: IMPORTS OF MINERAL COMMODITIES[1]

(Metric tons unless otherwise specified)

Commodity		1986	1987	Sources, 1987	
				United States	Other (principal)
INDUSTRIAL MINERALS—Continued					
Sulfur:					
Elemental:					
Crude including native and byproduct		518,369	521,005	11,048	Canada 396,885; Japan 108,935.
Colloidal, precipitated, sublimed		1,330	1,903	1,148	Japan 711.
Sulfuric acid		147,353	108,749	810	Japan 107,938.
Talc, steatite, soapstone, pyrophyllite		41,926	63,958	4,317	Hong Kong 12,750; Australia 9,311.
Vermiculite		([4])	NA		
Other:					
Crude		98,987	100,124	731	Japan 45,968; Australia 24,996.
Slag and dross, not metal-bearing		62,733	9,530	14	Japan 9,020; United Kingdom 496.
MINERAL FUELS AND RELATED MATERIALS					
Asphalt and bitumen, natural		89	80	79	Japan 1.
Carbon black		5,800	6,992	1,303	Japan 1,974; Australia 947.
Coal:					
Anthracite and bituminous	thousand tons	20,919	21,819	3,624	Australia 7,821; Canada 3,991.
Briquets of anthracite and bituminous coal		—	103	19	Australia 50.
Lignite including briquets		54,255	39,280	—	Australia 39,263.
Coke and semicoke		126,618	134,929	1,424	Japan 112,889; Australia 14,388.
Petroleum:					
Crude	thousand 42-gallon barrels	212,286	216,731	685	Saudi Arabia 33,459; Oman 26,836.
Refinery products:					
Liquefied petroleum gas	do.	9,120	29,388	1	Indonesia 19,575; Saudi Arabia 7,422.
Gasoline	do.	967	[5]9,797	28	Singapore 3,367; Saudi Arabia 1,826.
Naphtha	do.	8,032	NA		
Mineral jelly and wax	do.	95	109	13	Japan 78.
Kerosene and jet fuel	do.	395	3,073	90	Singapore 1,111; Japan 521.
Distillate fuel oil	do.	3,984	10,353	2,190	Saudi Arabia 3,614; Singapore 1,091.
Lubricants	do.	231	349	47	Japan 210; West Germany 59.
Residual fuel oil	do.	13,857	16,118	6,490	Japan 4,389; Saudi Arabia 1,672.
Bitumen and other residues	do.	19	([3])	([3])	Japan ([3]).
Bituminous mixtures	do.	5	4	1	United Kingdom 2.
Petroleum coke	do.	575	1,058	1,017	Japan 41.

NA Not available.

[1] Table prepared by Audrey D. Wilkes.

[2] Unreported quantity valued at $853,000.

[3] Less than 1/2 unit.

[4] Unreported quantity valued at $2,821.

[5] Includes naphtha.

tion and wage increases eroded price competitiveness. Posco bought more than 100,000 tons of Chinese coking coal in 1988 for its blast furnace mix. The imports of Indian iron ore were increased to 4 million tons per year. The Republic of Korea was the leading importer of iron scrap from the United States in 1988 with 307,000 tons valued at $34 million.

The country's steel industry could not meet the demand of the booming economy, which grew 12.2%. Steel consuming industries were automobiles, electronics, machinery, and shipbuilding. The steel shortage was further aggravated by the strike at Union Steel Manufacturing Co. Ltd. As a result, the Government planned to reduce or maintain its level of exports in 1989 as compared with that of 1988. Meanwhile, steel imports reportedly rose 22% in 1988. Steel demand was forecasted to be 27.2 million tons by 1990, whereas domestic production was expected to reach 21.8 million tons.

Lead and Zinc.—The Republic of Korea's lead consumption has been increasing steadily. In the first 7 months of 1988, 81,000 tons was used compared with 60,000 tons in the same period of 1987. The nation's only primary lead smelter and refinery, with a capacity of 15,000 tons per year, was run by Korea Mining and Smelting at Changhang. To meet the growing domestic demand, lead smelting capacity will be expanded with the announcement that Korea Zinc Co. Ltd. and Lurgi Gmbh of the Federal Republic of Germany plan to build a lead smelter using the QSL process. The new plant, with a capacity of 60,000 tons per year, will be near a zinc plant at Onsan using existing infrastructure. The plant is scheduled to be completed at the end of 1990. Raw material feed will come from indigenous resources and from imported materials.

Tungsten.—Owing to continued low world prices and the weakening of the U.S. dollar, the country's production of tungsten metal decreased to 1,900 tons in 1988. Korea Tungsten Mining Co. Ltd.'s Sang Dong scheelite mine cut back production to 1,750 tons of metal content, and instead of scheelite concentrate, the output was processed into downstream products such as ammonium paratungstate, tungsten metal, carbide powders, and cemented tungsten carbide, mostly sold at home with less for export to longstanding customers.

***Industrial Minerals.*—Barium and Strontium Carbonates.**—Samsung Corning Co. Ltd. and Kali-Chemie AG of the Federal Republic of Germany entered into a 50–50 joint venture for the production of barium carbonate and strontium carbonate on the northwest coast of the Republic of Korea with an investment of $35 to $40 million. The joint venture company, Daehan Speciality Chemicals Co. Ltd., plans to build the plant at a capacity of 30,000 to 40,000 tons per year of chemicals for use in the television, specialty glass, and electronics industries in the Republic of Korea initially and in the Far East market in the future. Plant completion is scheduled for 1989.

Cement.—The country's major cement producers, including Ssangyong Cement Industrial Co., planned to resume cement exports to the Middle East after the truce between Iran and Iraq took effect in August 1988. The Republic of Korea had exported 3 million tons of cement to the region in 1981. The region's market situation is expected to boom as reconstruction projects start.

Sulfur.—The Republic of Korea imported 521,000 tons of sulfur in 1987. To meet increasing domestic consumption, the Government (75%) and Daeboo Battery Co. Ltd. (25%) formed a 50–50 joint venture with Rich Coast Sulfur Co. of Vancouver, Canada, to develop the latter's Gongora sulfur deposit in Costa Rica. The Koreans will provide $9 million for development and working capital and have the right to buy the sulfur at a 5% discount to the world price. The deposit was reported to have a grade of 15% elemental sulfur, and the plan was to produce sulfur at the rate of 127,000 tons per year with a mine life of 5 to 6 years.

Mineral Fuels.—The Republic of Korea's coal reserves were mainly anthracite, which was its only major indigenous energy resource, with 640 million tons estimated to be economically minable. However, only 23 million tons of anthracite was being mined annually. Anthracite production and imports were cut back as domestic demand for anthracite for heating and cooking decreased because of growing environmental concerns and a shift to higher quality fuels such as liquefied natural gas (LNG). It was estimated that 2.8 million tons per year would be lost in anthracite production from small local mines. The country imported 1.5 million tons of anthracite in the first 10 months of 1988. However, the percentage share of domestic consumption of anthracite imports increased slightly. The major sources of anthracite imports in 1988 were China, the Soviet Union, the United States, and the Republic of South Africa, in descending order. Through Dai Han Coal Corp., the country imported 500,000 tons of Soviet anthracite in late 1988, compared with 170,000 tons in the first 8 months. Australia, India, Swaziland, and Vietnam also supplied anthracite to the Republic of Korea.

The country's iron and steel industry used one-half (as coking coal) of the bituminous coal imports, which totaled 14.3 million tons for the first 8 months. Australia was the largest supplier of bituminous coal with a market share of 40%, followed by Canada (24%), the United States (14%), and China. Posco reportedly sold its Tanoma Mine in Pennsylvania to American Metals & Coal Inc. of Greenwich, Connecticut, because of high operating costs. How-

ever, its coking coal imports were 2 million tons in 1988 of which 900,000 tons was from the Tanoma Mine or brokered by Tanoma. Posco's other two overseas mining projects, one in Canada and the other in Australia, provided over 1 million tons of coking coal per year. Steam coal imports of 7.1 million tons in the first 8 months were used in the power and cement industries as substitutes for oil. Korea Electric Power Corp. consumed a little over one-half that amount.

The Republic of Korea imported 230 million barrels of crude oil, mostly from the Middle East and Indonesia in 1988. Of particular significance were indirect imports from China, which totaled 3.5 million barrels, reflecting more relaxed trade relations between the two countries. To meet the rising demand for oil derivatives, three oil refineries (Yukong, Ssangyong, and Kyung In) planned to increase their refining capacities to a national total of 1.1 million barrels per day by 1991. The current oil refining capacity of the country is 840,000 barrels per day. The Government also planned to build a new $401 million underground petroleum storage center in the southern coastal area to increase its oil reserves. The present two oil storage facilities have a combined capacity of 36 million barrels.

The country's petrochemical industry plans to build two naphtha-cracking facilities: Korea Petrochemical Industry Co.'s 250,000-ton cracker near the Ulsan petrochemical complex in Onsan and either Hanyang Chemical Corp.'s or Honam Petrochemical Corp.'s 350,000-ton facility at the Yochon complex on the south coast. Three crackers already under construction were Yukong Ltd.'s 400,000-ton plant, Daelim Petrochemical Co. Ltd.'s 200,000-ton facility, both due for completion in 1989, and Lucky Ltd.'s 350,000-ton cracker to be completed in 1991. Altogether the ethylene capacity will become 2.1 million tons in 1992, whereas capacity was only 505,000 tons at yearend. Honam Oil Refinery Co. Ltd. dedicated a 120,000-ton polypropylene plant in January 1988. Three propylene plants were planned: Tongyang Nylon Co. Ltd.'s 150,000-ton facility in Ulsan, Isu Chemical Co. Ltd.'s 250,000-ton plant in Onsan, and STC Corp.'s 100,000-ton plant in Yochon.

The use of LNG rose 66% over that of 1987, still a relatively small fraction of overall energy consumption. Imported LNG from Indonesia was used for power generation, primarily, and city gas. The country's LNG demand was expected to rise to as much as 6 million tons annually by the year 2000 from about 2 million tons in 1988.

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[1] Physical scientist, Division of International Minerals.

[2] Where necessary, values have been converted from Korean won (W) to U.S. dollars at the rate of W730.6 = US$1.00 for 1988.

[3] Where necessary, values have been converted from Korean won (W) to U.S. dollars at the rate of W0.94 = US$1.00 for 1987 and 1988.

[4] Work cited in footnote 2.